



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/301,989	04/29/1999	HERZEL LAOR	4261500150	6316
27510	7590	01/10/2005	EXAMINER	
KILPATRICK STOCKTON LLP 607 14TH STREET, N.W. WASHINGTON, DC 20005			BEHREND, HARVEY E	
			ART UNIT	PAPER NUMBER
			3641	

DATE MAILED: 01/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No. 09/301989	Applicant(s) Lefort
Examiner Behrend	Group Art Unit 3641

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

Responsive to communication(s) filed on 10/15/04

This action is FINAL.

Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

Claim(s) 59-67 is/are pending in the application.

Of the above claim(s) _____ is/are withdrawn from consideration.

Claim(s) _____ is/are allowed.

Claim(s) 59-67 is/are rejected.

Claim(s) _____ is/are objected to.

Claim(s) _____ are subject to restriction or election requirement.

Application Papers

See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

The proposed drawing correction, filed on _____ is approved disapproved.

The drawing(s) filed on _____ is/are objected to by the Examiner.

The specification is objected to by the Examiner.

The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

All Some* None of the CERTIFIED copies of the priority documents have been received.

received in Application No. (Series Code/Serial Number) _____

received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

Attachment(s)

Information Disclosure Statement(s), PTO-1449, Paper No(s). 32 Interview Summary, PTO-413

Notice of Reference(s) Cited, PTO-892 Notice of Informal Patent Application, PTO-152

Notice of Draftsperson's Patent Drawing Review, PTO-948 Other _____

Office Action Summary

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 60, 62-67 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Note that this is essentially a new matter situation and is separate and distinct from the issue of enablement which is set forth in a separate rejection in section 4 below.

There is no support in the original disclosure for stating in claims 60, 65-67, that the first isotope formed (i.e. the ^8Be) is "co-located" or has an "overlapping wave function" with a ^4He atom in the Bose-Einstein condensate.

The original disclosure refers only to the original reactants (i.e., in this case the ^4He) as being co-located or as having "overlapping wave functions", not the reaction products such as ^8Be !

The quoted portions of the specification on pages 3 and 4 of the 10/15/04 response do not state that the reaction product ^8Be , is "co-located" or has an "overlapping wave function" with a ^4He .

Applicant irradiates the Bose-Einstein condensate with a laser beam. The photons from the laser beam will inherently interact with the particles in the Bose-Einstein condensate and produce energetic particles.

In addition, nuclear reaction products are inherently energetic.

The documents cited by applicant on the IDS (PTO-1449) filed 10/21/04, clearly show that energetic atoms can not exist as a Bose-Einstein condensate.

One of said documents, Ketterle et al, even states that in using light (photon) imaging of Bose-Einstein condensates, the photons themselves have enough energy to "knock" an atom out of the condensate (e.g. see pages 28, 29).

The specification (see for example page 9 line 19) states that the laser beam (which is allegedly utilized to cause fusion of two ^4He atoms), de-condenses the Bose-Einstein condensate (thus in essence, destroying the Bose-Einstein condensate). Such is also indicated by Ketterle et al (referred to above), i.e. that an energetic laser beam (which is what applicant utilizes) will destroy (heat up) a Bose-Einstein condensate. Applicants specification indicates that the desired nuclear fusion takes place upon de-condensing of the Bose-Einstein condensate (e.g. see page 4 lines 24+ and page 6 lines 2+).

If the Bose-Einstein condensate is de-condensed, said condensate no longer exists and, it is not possible for the ^8Be atom and an ^4He atom to be co-located in something which no longer exists!

In like manner, since the two ^4He atoms only fuse after the Bose-Einstein condensate has been de-condensed, it is not possible for the nuclear fusion reaction

product to be formed within the Bose-Einstein condensate (i.e. because it has already been de-condensed and thus, no longer exists).

There is no support in the original disclosure for the limitation in claim 62 that the fusing of the two atoms (compressing the atoms to facilitate tunneling through the potential barrier) results in the formation of at least a first isotope within the Bose-Einstein condensate (as pointed out above, the specification states that the nuclear fusion takes place upon de-condensing of the Bose-Einstein condensate). Thus, the condensate no longer exists and, the claimed "first isotope" cannot be formed in something which no longer exists.

Applicant in the last three lines of page 16 and the first two lines on page 17 of the 10/15/04 response, argues that claims 66 and 67 recite a "first" and "second" compression.

The original specification however, does not refer to a "first" and to a "second" compression to form two separate isotope or elements.

Instead, the original specification indicates that the fusing of two ^4He atoms to form ^8Be and, the subsequent fusing of this ^8Be atom with another ^4He atom to produce ^{12}C , all takes place with the same compression step (e.g. see the spec. on page 7 lines 25-30).

3. Claims 59-67 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. The use of a magnetic trap for forming the Bose-Einstein condensate and the use of ^4He atoms in an excited state, both of which are critical or essential to the practice of the invention, but not included in the claim(s) is not

enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). As pointed out for example in the Cornell et al, Scientific American article provided by applicant in the 11/14/01 IDS, and by Collins (Scientific American) the formation of a Base-Einstein condensate requires the use of a magnetic trap along with laser trapping and cooling (the claims however, do not recite this critical use of a magnetic trap). Santos et al and Schewe et al show that a Bose-Einstein condensate was only obtained by using helium atoms in an excited state (the claims however, do not recite this critical feature).

4. The specification is objected to under 35 U.S.C. §112, first paragraph, as failing to adequately teach how to make and/or use the invention i.e., failing to provide an enabling disclosure, for the reasons set forth in the 5/8/03 Office action (in sections 2-3 on pages 2-7 thereof), in the 9/26/01 Office action (in sections 3-4 on pages 2-7 thereof), in the 2/21/01 Office action (in section 5-9 on pages 3-7 thereof) and in the 7/5/00 Office action (in sections 6 and 9 on pages 3-6 thereof).

Applicants' arguments are unpersuasive.

As set forth in MPEP 2164-2164.08, the statute requires the applicant to teach how to make and/or use the invention.

As set forth in the above referenced sections of the previous Office actions, the examiner has set forth a reasonable basis for challenging the adequacy of the present disclosure and, has shown that applicant has not taught the artisan how to make and/or use the invention. Applicant has not shown such to be in error.

Applicants claims require the providing of a Bose-Einstein condensate of atoms which can be made to undergo nuclear fusion. Claims 59-61 and 63-67 as well as most of applicants specification, are specific to the use of He-4 as the atoms for the condensate.

Accordingly, applicants disclosure must be reviewed to determine if it complies with the requirements of the statute in teaching the artisan how to make and/or use the invention (including the claimed step of providing a Bose-Einstein condensate of nuclear fusible atoms).

Applicants specification indicates the Bose-Einstein condensate can either be made (provided) within the reaction chamber 104 itself, or, it can be made outside the reaction chamber 104 and be transported to a desired point within the reaction chamber 104 (e.g. see the specification on page 7 lines 8-12).

The formation of a Bose-Einstein condensate (which is inherently necessary for the claimed step of "providing" a Bose-Einstein condensate) has been shown in the art to require the use of a magnetic trap, which is hence a critical feature (e.g. see Cornell et al (Scientific American article provided by applicant in the 11/14/01 IDS) and Collins (Scientific American, Dec. 2000).

Applicants specification and drawings however, do not refer to or disclose this critical feature of the use of a magnetic trap in the forming of (and hence the providing of) a Bose-Einstein condensate.

Assuming for the sake of argument that the artisan would somehow "know" that one must utilize a magnetic trap in providing a Bose-Einstein condensate in applicants

invention, the issue then becomes whether or not there is an enabling disclosure of how such can be accomplished (it is the examiner's position that there is no such enabling disclosure).

Assuming that the Bose-Einstein condensate is to be made (provided) inside applicants reaction chamber 104, there is no enabling disclosure of how and in what manner, said magnetic trap (or the apparatus for producing said magnetic trap) as well as the laser means used for the trapping and cooling, could be operatively incorporated into applicants reaction chamber 104 so as to show how to make and use applicants claimed inventions as required by statute.

If the Bose-Einstein condensate is to be first made in preparation chamber 124 and than transported/delivered to a desired point within reaction chamber 104, there is no adequate description nor enabling disclosure of how and in what manner, said magnetic trap (or the apparatus for forming such) as well as the laser means for the trapping and cooling, can be transported/delivered from the preparation chamber 124 to the desired point in the reaction chamber 104, so as to be able to maintain the Bose-Einstein condensate as a condensate during transportation (and thus meet the claim limitations of "providing" a Bose-Einstein condensate, which is then compressed to the point that at least two atoms thereof undergo nuclear fusion).

Assuming for the sake of argument that applicant is actually to form (and hence provide) a Bose-Einstein condensate without the use of a magnetic trap (disclosed as necessary by Cornell et al and Collins (see above discussion of such)), the disclosure is

insufficient and non-enabling as to how and in what manner such can actually operatively be accomplished.

All of applicants claims require the providing of a Bose-Einstein condensate of atoms that are capable of undergoing nuclear fusion. Applicants claims 59-61, 63 (and by inference, claims 64-67) require said atoms (that are capable of undergoing nuclear fusion) to be ^4He atoms.

The examiner on page 4 of the 9/26/01 Office action referred to an article by Sid Perkins as indicating problems/difficulties in obtaining a Bose-Einstein condensate of helium.

Santos et al and Schewe et al show that a Bose-Einstein condensate of helium was finally obtained in 2001 (six years after the first Bose-Einstein condensate (of rubidium) was formed in 1995) (which is in itself considered evidence of undue experimentation).

More importantly, Santos et al and Schewe et al show that a Bose-Einstein condensate in helium was only obtained by using helium atoms in an excited state, an apparently critical feature not disclosed in the present specification. Applicants disclosure is hence insufficient in failing to disclose this apparently critical feature of the helium being in an excited state as well as the equipment/procedures/techniques/etc., that was necessary to actually obtain said Bose-Einstein condensate of helium.

Schewe et al and Santos et al are thus evidence that applicants disclosure was not enabling nor operative as of its filing date.

Schewe et al, state that one of the drawbacks, the price one pays for using atoms in an excited state, is that it is thus difficult to gather a large ensemble of atoms together into the condensate.

Note that Collins on page 95 describes Bose-Einstein condensates as "minuscule wisps of gas barely more substantial than a vacuum, held in place by magnetic fields for a scant few minutes at best".

Combining the Schewe et al teachings with those of Collins means there will be even less He atoms present in the Bose-Einstein condensate and thus even less of a chance of nuclear fusion taking place!

Applicant is relying on the first two documents cited in his 10/15/04 IDS (the Ketterle et al and Tutorial documents) as providing evidence that it was known how to form and thus "provide", a Bose-Einstein condensate of nuclear fusible atoms, as of applicants filing date. On page 6 of the 10/15/04 response, applicant admits that Ketterle et al was published after the filing of applicants application (and thus cannot be relied on), but alleges it cites numerous references disclosing the formation of Bose-Einstein condensates.

If applicant is actually intending to rely on said "numerous references" as showing the formation of a Bose-Einstein condensate of nuclear fusible atoms, it is applicants responsibility to provide the Office with copies thereof for appropriate review.

The "Tutorial" document indicates that Cornell and Wieman formed a Bose-Einstein condensate of rubidium atoms in 1995.

Even applicants more speculative nuclear reactions on pages 8 and 9 of the specification do not refer to rubidium as a fusible atom! Thus the "Tutorial" document cannot be relied on as showing the formation of, nor, the "providing of", a Bose-Einstein condensate of nuclear fusible atoms.

Applicant has discussed the claimed "providing" step of claims 59 and 62 on pages 7 and 8 of the 10/15/04 response. On said page 8, applicant has quoted a portion of page 11 of the specification and has stated that this quoted portion "coupled with what was known in the art, enables the claimed "providing" limitations of claims 59 and 62".

However, applicant has failed to specifically identify said "known art" which enables the claimed "providing" limitations of claims 59 and 62 and, the disclosure is hence insufficient and non-enabling. This is especially so since the examiner has already provided documentary evidence that one of ordinary skill in this art (including applicant himself!) did not know the requisite parameters nor did they know how and in what manner, the artisan could operatively form and/or provide, a Bose-Einstein condensate of nuclear fusible atoms.

As evidence that applicants disclosure is insufficient and non-enabling, the examiner had referenced two of applicants own publications submitted with the 7/17/01 response (the Fusion Technology article and the Laser Focus World article).

Likewise with an October 20, 1998 article by applicant entitled "Coulomb Potential Tunneling in the De-Condensing Process of Bose-Einstein Condensate" (hereinafter, Laor (III)), in which applicant on page 1 states "it is not certain that all

atoms have fully overlapped wavefunctions, but we can assume that some of them overlap", and, on page 2 "it is suggested to irradiate a Bose-Einstein Condensate of light atoms with a femto-second laser pulse as an attempt to achieve fusion. It is hoped that upon de-condensing, a tunneling of the Coulomb potential will occur, enabling nuclear fusion. Detection of gamma ray emission could verify if any fusion occurred. Mass spectrometry of the resulting materials can also confirm any fusion". (Underlining added).

Such was also personally indicated by applicant to the examiner in the 7/12/01 interview in which Mr. Laor indicated that while he considered or believed that his invention would work in the manner indicated, actual experiments would be necessary to confirm his beliefs and to determine the actual system parameters necessary to cause nuclear fusion!

Such is all considered evidence that even applicant does not consider his disclosure to adequately teach how to make and use the invention, i.e. to provide an enabling disclosure, nor, even that it is actually operative.

The nuclear fusion of two ^4He atoms is an endothermic reaction requiring the addition of 91.98 keV of energy (page 242 of Hansen et al (cited by applicant in the 11/14/01 IDS)).

Presumably, this additional energy is to come from the irradiating laser beam which is to compress the Bose-Einstein condensate. It is noted that "compressing" a material is generally considered as adding energy to said material (if applicant believes he is able to compress the Bose-Einstein condensate without adding energy thereto,

applicant should provide evidence to support any such allegation and, applicant must provide the requisite laser parameters which would accomplish such so as to provide an enabling disclosure).

However, the Ketterle et al article cited by applicant in the 10/15/04 IDS states that even in using light (photons) just for imaging of a Bose-Einstein condensate, the photons have enough energy to "knock" an atom out of the condensate (it is further noted in this respect that the sentence bridging pages 3 and 4 of the specification states that even "light" is sufficient to "compress" the Bose-Einstein condensate to the point that nuclear fusion takes place). The Sid Perkins article, also cited in said 10/15/04 IDS states that even phonons (which are packets of vibrational energy analogous to photons of light) will "knock" atoms out of a condensate.

Thus applicants invention to be operative, requires a femtosecond laser that is capable of compressing the Bose-Einstein condensate of ^4He atoms to the point that two of them can tunnel through the potential barrier (while adding 91.98 keV of energy to these two ^4He atoms to enable the endothermic nuclear fusion of two ^4He atoms to form ^8Be to proceed), all before the Bose-Einstein condensate has been destroyed from all the energy the laser beam is adding to the Bose-Einstein condensate and before the atoms are "knocked" out of the condensate by the photons themselves.

Applicant has argued that the term or phrase, "compressing (or de-condensing) the Bose-Einstein condensate", does not mean, "destroying the Bose-Einstein condensate". The normal meanings given the terms "compressing" and "de-condensing" as used by applicant in the specification and claims, has been discussed in

detail in section 13 below. However, as just pointed out, applicant has argued that the terms or phrases of "compressing" or "de-condensing" the Bose-Einstein condensate, do not have said referred to "normal meanings".

Accordingly, there is no adequate description nor enabling disclosure of what all is meant by and is encompassed by the term or phrase "compressing the Bose-Einstein condensate", as well as by the term or phrase "de-condensing the Bose-Einstein condensate".

However, even if applicant somehow was actually able to cause the endothermic reaction of two ^4He atoms fusing to produce ^8Be , such would not be sufficient to provide a useful operative invention.

That is because this specific nuclear reaction is a net user of energy, not a net producer of energy.

Applicants invention as disclosed is to a method and apparatus for producing energy (see the specification on page 1 lines 8+, page 7 lines 25-30).

As stated on said page 7 lines 25-30, the reaction product ^8Be is unstable with a lifetime on the order of 10^{-15} seconds so that applicant must somehow, cause an additional ^4He atom to immediately fuse with the unstable ^8Be atom to create ^{12}C and energy.

There is no disclosure whatsoever as to how and in what manner, such is to be actually operatively accomplished. Instead there is only applicants statement in the specification that is what must be done.

If applicant was aware of the requisite system parameters (including laser energy, wavelength, intensity, etc.) necessary to present an operative embodiment, it was his responsibility to provide such to comply with the requirements of the statute. It is the examiner's position that the documents of record in this application as a whole, clearly show that undue experimentation would be required to produce an operative embodiment of applicants invention.

Applicants own statements in his own articles referenced above and his own statements to the examiner in the personal interview on 7/12/01 that actual experiments would be necessary to confirm his beliefs and to determine the actual system parameters necessary to cause nuclear fusion, are clear evidence that undue experimentation would be required to determine said parameters.

The mere fact that said system parameters still have not been shown to be known at the present time (Dec. 2004), more them six years after applicants claimed priority date, is further evidence of undue experimentation.

Accordingly, all issues set forth above (which also incorporates the issues set forth in section 2 of the 5/8/03 Office action, section 5 of the 2/21/01 Office action, and, section 6 of the 7/5/00 Office action) are still pertinent in determining the patentability of applicants claims.

5. Claims 59-67 are rejected under 35 U.S.C. §112, first paragraph, for the reasons set forth in the objection to the specification, in section 4 above.

6. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

7. Claims 59-67 are rejected under 35 U.S.C. 101 because the invention as disclosed is inoperative and therefore lacks utility, for the reasons set forth in the 2/21/01 Office action (see sections 14-19 on page 8-10 thereof) and in section 6 of the 9/26/01 Office action (see pages 7 and 8 thereof), in section 5 of the 5/8/03 Office action, and for the reasons set forth in section 4 above.

The examiner has presented reasoning and documentary evidence to support his position and, applicants general allegations do not overcome such.

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 62-67 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by any of Lo (US 4875213, hereinafter, Lo (I)), Lo (WO 93/11543, hereinafter, Lo (II)), Lo (WO 87/00681, hereinafter, Lo (III)), Lo (IV) (US 4926436) or Lo (V) (W0 90/13130), for the reasons set forth in section 9 of the 9/26/01 Office action and, in section 8 of the 5/8/03 Office action.

Applicants arguments are unpersuasive. Applicant does not appear to have commented on the following quoted statement from said section 8 of the 5/8/03 Office action:

It is an inherent property of a laser beam that it will apply pressure to (i.e. compress) whatever it irradiates (it is noted that applicant is aware of such because this light pressure is even referred to in the first column on page 22 of Mourou et al (Physics Today, Jan. 1998) submitted by applicant in the 11/19/01 IDS).

Thus, the application of the laser beam to the Bose-Einstein condensate in each of the Lo references, will inherently involve compression thereof.

It is noted that applicant in the sentence bridging pages 3, 4 of the specification recites several sources (including just plain light) as being adequate for providing the compressive force necessary to cause the desired nuclear fusion. The specification does not indicate any criticality to the compressive energy source necessary to cause the nuclear fusion, thus indicating that applicant himself considers any such compressive energy source to be sufficient.

However, and in any event, as previously pointed out to applicant, the Lo references themselves each refer to the use of He atoms and of obtaining nuclear fusion.

The examiner did not refer to the bottom of page 15 of Lo (V) (applicants arguments on page 15 of the 10/15/04 response). Instead, the examiner had referred only to page 15 of Lo (V) as having the statement in question. The statement in question is found in lines 4-7 on said page 15 wherein it is stated that the alpha (helium) particle's can fuse with the release of additional energy to become coherent ^8Be .

As to applicants arguments specific to claims 66 and 67, it is noted that the claims themselves do not refer to any separate time periods for formation of the first isotope (⁸Be), and, for the subsequent fusion thereof with another atom. Since the specification and claim 65 indicate the ⁸Be has a lifetime on the order of 1×10^{-15} seconds, there cannot be much time between the two events. Thus, the claim language reads on the original application of the laser beam to the Bose-Einstein condensate in each of the Lo references.

10. Claims 62-67 are rejected under 35 U.S.C. 103(a) as being unpatentable over any of Lo (I), Lo (II), Lo (III), Lo (IV) or Lo (V), in view of either Cornell et al (Scientific American, March 1998) or Mourou et al (Physics Today, Jan. 1998).

Applicant appears to be arguing that laser light will not inherently apply pressure to (and hence compress) a particle or a bunch or mass of particles.

Cornell et al in the first and second columns on page 43 states that the photons from the lasers, apply pressure to the atoms and push them to the center of the magnetic trap and hold them there. Mourou et al in the first column on page 22, refers to the high pressures that can be caused by light pressure.

Applicant has already admitted that each of the Lo references illustrates a Bose-Einstein condensate which is irradiated with a laser beam.

The secondary references as discussed each show that laser beams will inherently apply pressure to any material or particle it comes in contact with.

Hence, if not already inherent, it would have been *prima facie* obvious to have utilized the laser in any of the Lo references to apply pressure to (and hence compress)

the Bose-Einstein condensate, so as to take advantage of the inherent properties of laser light.

11. Claims 59-67 are rejected under 35 U.S.C. 103(a) as being unpatentable over any of Lo (US 4875213, hereinafter, Lo (I)), Lo (WO 93/11543, hereinafter, Lo (II)), Lo (WO 87/00681, hereinafter, Lo (III)), Lo (IV) (US 4926436) or Lo (V) (WO 90/13130) in view of any of Corkum, Schaffer, Olson, Laser Focus World or Optical Materials & Engineering News, for the reasons set forth in section 10 of the 9/26/01 Office action and, in section 9 of the 5/8/03 Office action.

Note the discussion of applicants arguments concerning the primary references in section 9 above.

12. Claims 59-67 are rejected under 35 U.S.C. 103(a) as being unpatentable over any of Lo (I), Lo (II), Lo (III), Lo (IV), or Lo (V) in view of any of Corkum, Schaffer, Olson, Laser Focus World or Optical Materials & Engineering News as applied to claims 59-67 above, and further in view of either Cornell et al or Mourou et al, for the reasons set forth in section 10 above.

13. Claims 59-67 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims are vague, indefinite and incomplete, particularly as to what all is meant by and is encompassed by such terms or phrases as "de-condenses" the Bose-Einstein condensate, "compressing" a Bose-Einstein condensate or "compressing" the atoms within a Bose-Einstein condensate, "compressing" the claimed first isotope and a

⁴He atom with overlapping wave functions, "compression and/or rapid de-condensing" of a Bose-Einstein condensate, "compress/de-condense" the Bose-Einstein condensate, "providing" a Bose-Einstein condensate.

The specification (see for example, the paragraph bridging pages 3 and 4) states that a laser beam is used to compress a Bose-Einstein condensate which causes the Bose-Einstein condensate to de-condense.

The common dictionary definition of the prefix "de" is the reversal of, or, the opposite of (e.g. see page 349 of the Webster's II dictionary).

Thus, according to this common dictionary meaning, when the Bose-Einstein condensate is de-condensed, it is no longer a condensate (meaning that the Bose-Einstein condensate no longer exists and has thus been destroyed).

However, applicant has apparently taken the position that "de-condensed" does not mean "destroyed" and that "compressing the Bose-Einstein condensate" does not destroy it or presumably, even de-condense it.

The specification, however, used the terms "compress" and "de-condense" interchangeably.

As pointed out by the examiner in sections 2 and 4 above, "compressing" a material is generally considered as adding energy to the material by moving it. As pointed out in the documents of record, to obtain a Bose-Einstein condensate, one must slow the motion of the atoms down to almost nothing by cooling them to a fraction above absolute zero (e.g. see the Collins article in Scientific American, Dec. 2000).

Thus it is logical that a laser beam which is "compressing" the atoms in the "condensate", is moving the atoms and thus supplying them with energy. Indeed, as pointed out in said section 4 above, the nuclear fusion of two ^4He atoms is an endothermic reaction requiring the addition of 91.98 KeV of energy and, this required energy must come from applicants laser beam. Thus applicants laser beam must inherently heat up and destroy, the Bose-Einstein condensate. This is especially so since even the Ketterle et al article cited by applicant in the 10/15/04 IDS states that in using light (photons) just for imaging of a Bose-Einstein condensate, the photons still have enough energy to "knock" an atom out of the condensate.

While an applicant can be his own lexicographer, no term can be given a meaning repugnant to the usual meaning of the term. See MPEP 2173.05(a).

Thus, to state or argue that applicant is able to use a laser beam to "compress" a Bose-Einstein condensate (as well as to add enough energy to enable the endothermic ^4He - ^4He nuclear fusion reaction to take place), without de-condensing (destroying) it, is giving this term a meaning, repugnant to its usual and normal meaning in this art.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harvey Behrend whose telephone number is (703) 305-1831. The examiner can normally be reached on Tuesday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Carone, can be reached on (703) 306-4198. The fax phone number for the organization where this application or proceeding is assigned is (703) 306-4195.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-1113.



Behrend/vs
December 7, 2004

HARVEY E. BEHREND
PRIMARY EXAMINER